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Abstract: Time-domain nuclear magnetic resonance spectroscopy (TD-NMR) and low-field nuclear magnetic resonance spectroscopy (LF-NMR) are different techniques that vary in the range of magnetic field strengths that they use, which is a determining factor for the type of analysis that can be done. In this study, LF-NMR was used to perform a time-domain analysis of petroleum products, diesel and kerosene. This is a type of analysis which is typically performed using TD-NMR. Diesel and kerosene are two petroleum products that have different characteristics such as viscosity, boiling point, and hydrocarbon length. Diluting, or adulterating, diesel fuels with kerosene is a common practice which allows gasoline companies to cut costs of production. This procedure, however, alters the chemistry of the fuel which can subsequently, at high enough concentrations of kerosene, make the consumption of this fuel mixture damaging to the mechanical engine within which the fuel is combusting. LF-NMR, although not conventionally used to conduct this type of analysis, was used to successfully measure the transverse relaxation time of three different diesel samples adulterated with kerosene. The average transverse relaxation time for unadulterated diesel was measured to be 0.71 s, while the average transverse relaxation time for kerosene was measured to be 1.29 s. These values agree with those measured using traditional TD-NMR. The transverse relaxation time correlated linearly with the percent of kerosene in the mixtures, as seen in previous TD-NMR studies. The data collected supports an inverse relationship between the viscosity of a substance (3.39 cSt for diesel and 1.20 cSt for kerosene) and its relaxation time. LF-NMR is a suitable alternative to this spectroscopic analysis of adulterated petroleum products, with measured relaxation times similar to those determined using TD-NMR.